

This listing of claims will replace all prior versions and listings of claims in the application:

**LISTING OF CLAIMS:**

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**1-34. (Canceled)**

**35. (Amended)** A medium molecular weight heparin (MMWH) composition comprising a mixture of sulfated oligosaccharides having molecular weights ranging from about 6,000 Daltons to about 12,000 Daltons wherein at least 15% of said oligosaccharides have at least one pentasaccharide sequence that interacts with antithrombin.

**36. (Previously Presented)** The MMWH composition of claim 35, wherein the oligosaccharides are of sufficient length to inhibit fibrin-bound thrombin and fluid-phase thrombin by catalyzing antithrombin, and to inhibit thrombin generation by catalyzing factor Xa inactivation by antithrombin.

**37. (Previously Presented)** The MMWH composition of claim 35, wherein said oligosaccharides are of sufficient length to bridge antithrombin or heparin cofactor II (HCII) to thrombin but do not bridge thrombin to fibrin.

**38. (Previously Presented)** The MMWH composition of claim 35, wherein at least 31% of said oligosaccharides have a molecular weight greater than or equal to about 7,800.

**39. (Previously Presented)** The MMWH composition of claim 35, wherein said oligosaccharides have molecular weights ranging from about 8,000 Daltons to about 10,000 Daltons.

**40. (Previously Presented)** The MMWH composition of claim 38, wherein said oligosaccharides have molecular weights of about 8,500 Daltons.

**41. (Previously Presented)** The MMWH composition of claim 35, wherein at least 20% of said oligosaccharides have at least one pentasaccharide sequence.

**42. (Previously Presented)** The MMWH composition of claim 41, wherein at least 30% of said oligosaccharides have at least one pentasaccharide sequence.

**43. (Previously Presented)** The MMWH composition of claim 42, wherein at least 35% of said oligosaccharides have at least one pentasaccharide sequence.

**44. (Previously Presented)** The MMWH composition of claim 43, wherein at least 40% of said oligosaccharides have at least one pentasaccharide sequence.

**45. (Previously Presented)** The MMWH composition of claim 35, wherein said MMWH composition has an anti-factor IIa activity of about 40 U/mg to about 100 U/mg, and an anti-factor Xa activity of about 90 U/mg to about 150 U/mg.

**46. (Previously Presented)** The MMWH composition of claim 45, wherein said MMWH composition has an anti-factor IIa activity of about 60 U/mg to about 75 U/mg, and an anti-factor Xa activity of about 100 U/mg to about 125 U/mg.

**47. (Previously Presented)** The MMWH composition of claim 35, wherein said oligosaccharides have a polydispersity of 1.1 to 1.5.

**48. (Previously Presented)** The MMWH composition of claim 47, wherein said oligosaccharides have a polydispersity of 1.2 to 1.4.

**49. (Previously Presented)** The MMWH composition of claim 35, wherein said MMWH composition has anti-factor Xa activity and anti-factor IIa activity and wherein the ratio of anti-factor Xa activity to anti-factor IIa activity is from about 2:1 to about 1:1.

**50. (Previously Presented)** The MMWH composition of claim 35 comprising a mixture of oligosaccharides derived from heparin having antithrombin and HCII related anticoagulant activity; having sufficient length to bridge antithrombin or HCII to thrombin, but

do not bridge thrombin to fibrin; having at least 20%, 25%, 30%, 35%, or 40% oligosaccharides with at least one or more pentasaccharide sequence; and being enriched for oligosaccharides having a molecular weight range from about 8,000 to 10,000 Daltons.

**51. (Previously Presented)** The MMWH composition of claim 35 comprising a mixture of oligosaccharides derived from heparin having sufficient length to bridge antithrombin or HCII to thrombin, but do not bridge thrombin to fibrin; having at least 20%, 25%, 30%, 35%, or 40% oligosaccharides with at least one or more pentasaccharide sequence; having a mean molecular weight of about 8,000 to 9,800 Daltons; and having a polydispersity of about 1.1 to about 1.5.

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*Cont'd*  
**52. (Previously Presented)** The MMWH composition of claim 35 comprising a mixture of oligosaccharides derived from heparin having sufficient length to bridge antithrombin or HCII to thrombin, but do not bridge thrombin to fibrin; having at least 20%, 25%, 30%, 35%, or 40% oligosaccharides with at least one or more pentasaccharide sequence; being enriched for oligosaccharides having a molecular weight range from about 8,000 to 10,000 Daltons; having a mean molecular weight of about 8,000 to 9,800 Daltons; and having similar anti-factor Xa and anti-factor IIa activities wherein the ratio of anti-factor Xa activity to anti-factor IIa activity is from about 2:1 to about 1:1.

**53. (Previously Presented)** The MMWH composition of claim 50 comprising a mixture of oligosaccharides derived from heparin having a polydispersity of about 1.1 to about 1.5.

**54. (currently amended)** A MMWH composition of claim 35 comprising a mixture of oligosaccharides derived from heparin having sufficient length to bridge antithrombin or HCII to thrombin, but do not bridge thrombin to fibrin; having a mean molecular weight of about 8,000 to 9,800 Daltons; having a polydispersity of about 1.1 to about 1.5; having an anti-factor Xa activity from about 80 IU/mg to about 105 IU/m

**55. (Previously Presented)** The MMWH composition of claim 54 comprising a mixture of oligosaccharides derived from heparin wherein at least 30%, 35%, 40%, 45%, or 50% of said oligosaccharides have a molecular weight greater than or equal to 8,000 Daltons.

**56. (Previously Presented)** The MMWH composition of claim 53 comprising a mixture of oligosaccharides derived from heparin wherein at least 30%, 35%, 40%, 45%, or 50% of said oligosaccharides have a molecular weight greater than or equal to 8,000 Daltons; having similar anti-factor Xa and anti-factor IIa activities wherein the ratio of anti-factor Xa activity to anti-factor IIa activity is from about 2:1 to about 1:1; having an anti-factor Xa activity from about 80 IU/mg to about 105 IU/mg; and having an anti-factor IIa activity from about 20 IU/mg to about 150 IU/mg.

**57. (Previously Presented)** A method of treating a thrombotic condition in a subject comprising administering to said subject a pharmacologically acceptable dose of the MMWH composition of claim 35.

**58. (Previously Presented)** The method of claim 57, wherein said thrombotic condition is arterial thrombosis, coronary artery thrombosis, venous thrombosis, or pulmonary embolism.

**59. (Previously Presented)** The method of claim 57, wherein said MMWH composition is administered by injection.

**60. (Previously Presented)** A method of preventing the formation of a thrombus in a subject at risk of developing thrombosis comprising administering to said subject a pharmacologically acceptable dose of the MMWH composition of claim 35.

**61. (Previously Presented)** The method of claim 60, wherein said subject is at increased risk of developing thrombosis due to a medical condition which disrupts hemostasis.

**62. (Currently Amended)** The method of claim 61, wherein the medical condition is [coroanary] coronary artery disease, or atherosclerosis.

**63. (Previously Presented)** The method of claim 60, wherein said subject is at increased risk of developing thrombosis due to a medical procedure.

**64. (Previously Presented)** The method of claim 63, wherein the medical procedure is cardiac surgery, cardipulmonary bypass, catheterization, or atherectomy.

**65. (Previously Presented)** The method of claim 64, wherein the catheterization is cardiac catheterization.

**66. (Previously Presented)** A method of inhibiting thrombus formation in a patient comprising the step of administering to the patient a pharmacologically acceptable dose of the MMWH composition of claim 35.

**67. (Previously Presented)** A composition comprising the MMWH composition of claim 35 and a pharmaceutically acceptable carrier.

**68. (Previously Presented)** A method of treating deep vein thrombosis in a patient comprising administering to said patient undergoing orthopedic surgery a therapeutically effective amount of the MMWH composition of claim 35.

69. (Previously Presented) A method of preventing a pulmonary embolism in a subject comprising administering to said subject a therapeutically effective amount of the MMWH composition of claim 35.

70. (New) A medium molecular weight heparin (MMWH) composition comprising a mixture enriched for sulfated oligosaccharides derived from heparin by enzymatic cleavage with heparinase having molecular weights ranging from about 8,000 Daltons to about 12,000 Daltons wherein at least 15% of said oligosaccharides have at least one pentasaccharide sequence.

71. (New) A MMWH composition of claim 70 wherein the oligosaccharides have (a) antithrombin and HCII related anticoagulant activity; (b) sufficient length to bridge antithrombin or HCII to thrombin, but not bridge thrombin to fibrin; (c) at least 20%, 25%, 30%, 35%, or 40% oligosaccharides with at least one or more pentasaccharide sequence; and (b) a molecular weight range from about 8,000 to 10,000 Daltons.

72. (New) A MMWH composition of claim 71 having a mean molecular weight of about 8,000 to 9,800 Daltons and having a polydispersity of about 1.1 to about 1.5.

73. (New) A MMWH composition of claim 71 wherein the oligosaccharides have similar anti-factor Xa and anti-factor IIa activities wherein the ratio of anti-factor Xa activity to anti-factor IIa activity is from about 2:1 to about 1:1.



74. (New) A MMWH composition of claim 73 wherein the oligosaccharides have an anti-factor Xa activity from about 80 IU/mg to about 105 IU/mg, and an anti-factor IIa activity from about 20 IU/mg to about 150 IU/mg.

75. (New) A medium molecular weight heparin (MMWH) composition comprising a mixture of sulfated oligosaccharides wherein (a) at least 31% of the oligosaccharides have molecular weights ranging from about 8,000 Daltons to about 10,000 Daltons; (b) at least 15% of said oligosaccharides have at least one pentasaccharide sequence; and (c) the oligosaccharides are of sufficient length to bridge antithrombin or heparin cofactor II (HCII) to thrombin but do not bridge thrombin to fibrin.

76. (New) A MMWH composition of claim 75 having a polydispersity of about 1.1 to about 1.5.

77. (New) A MMWH composition of claim 75 wherein the oligosaccharides have similar anti-factor Xa and anti-factor IIa activities wherein the ratio of anti-factor Xa activity to anti-factor IIa activity is from about 2:1 to about 1:1.

78. (New) A MMWH composition of claim 75 wherein the oligosaccharides have an anti-factor Xa activity from about 80 IU/mg to about 105 IU/mg, and an anti-factor IIa activity from about 20 IU/mg to about 150 IU/mg.

79. (New) A method of treating a thrombotic condition in a subject comprising administering to said subject a pharmacologically acceptable dose of the MMWH composition of claim 70.

80. (New) A method of treating a thrombotic condition in a subject comprising administering to said subject a pharmacologically acceptable dose of the MMWH composition of claim 75.

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